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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/915,936	07/25/2001	Kouji Kurosaki	IIW-006	8248

959 7590 04/12/2004

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EXAMINER	
TSANG FOSTER, SUSY N	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 04/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/915,936	KUROSAKI ET AL.
	Examiner	Art Unit
	Susy N Tsang-Foster	1745

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 06 January 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment filed on 1/6/2004. Claim 7 has been amended. Claims 1-7 are pending. This Office Action is made non-final as new grounds of rejection are made that are not necessitated by applicant's amendment.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In general, the claims are indefinite and it is unclear to the Examiner what applicant is claiming as their invention.

In claim 1, the limitation "a compressor which controls the amount of the gas to be supplied into the fuel cell" is indefinite because it is unclear whether the gas being referred to is the anode gas or the cathode gas.

In claim 1, the limitation "a pressure control valve which controls the gas pressure of the fuel cell and which is provided on the downstream side of the fuel cell" is indefinite because it is

unclear what gas pressure is meant in this limitation since the fuel cell has two gas pressures, one gas pressure on the anode side of the fuel cell and another gas pressure on the cathode side of the fuel cell. Furthermore, it is unclear what the downstream side of the fuel cell is since the fuel cell has two downstream sides, an anode downstream side and a cathode downstream side.

The Examiner disagrees with applicant's assertions on page 6 of the amendment filed on 1/6/2004 that reference number 8A in Figure 1 shows a pressure control valve which controls the gas pressure of the fuel cell and which is provided on the downstream side of the fuel cell in general since reference number 8A in Figure 1 clearly shows that it controls the air pressure as stated on page 11, line 6 of the specification.

In claim 1, the limitation "changing an amount of the supply gas by said compressor" is indefinite because it is unclear what supply gas is being referred to in this limitation. It is the anode gas or the cathode gas that is being controlled by the compressor?

The Examiner disagrees with the applicant's assertion on page 6 of the amendment filed on 1/6/2004 that compressor 7B in Figure 1 controls the fuel gas flow to the fuel cell since applicant contradicts himself by stating that the specification on page 10, lines 15-21 disclose "supercharger (S/C) 7B can be driven at a rotation speed ranging from 0 to 12,000 rpm, and can linearly change an airflow amount Q depending upon the rotation speed..." It is the Examiner's position that the compressor controls the air flow that enters into the cathode side of the fuel cell, not the fuel gas which enters the anode side of the fuel cell.

In claim 1, the limitation "the transition period of the fuel cell" lacks antecedent basis within the claim and it is unclear what the transition period of the fuel cell is and the term "transition period" is not defined in the claims or in the specification. For example, is the transition period of the fuel cell the startup, the shutdown or load variation during operation of the fuel cell?

In claim 2, the limitation "the flow amount of the gas supplied into a fuel cell" is indefinite because it is unclear what gas is being referred to.

In claim 2, the limitation "a pressure feedback control step which controls the pressure of the fuel cell to be a prescribed value" is indefinite because it is unclear what pressure of the fuel cell is being referred to since the fuel cell has two pressures, one pressure on the anode side and another pressure on the cathode side.

In claim 2, the limitation "said feedback steps being stopped during the transition period of the fuel cell" is indefinite because it is unclear what the transition period of the fuel cell is and the term "transition period" is not defined in the claims or in the specification. For example, is the transition period of the fuel cell the startup, the shutdown or load variation during operation of the fuel cell?

In claim 3, the limitation "a compressor which controls the amount of the gas to be supplied into the fuel cell" is indefinite because it is unclear what gas is being referred to in this limitation.

In claim 3, the limitation "a pressure control valve which controls the gas pressure of the fuel cell and which is provided on the downstream side of the fuel cell" is indefinite because it is unclear what gas pressure is being referred to in this limitation and it is unclear what downstream side of the fuel cell is being referred to since there are two downstream sides to a fuel cell, the anode downstream side and the cathode downstream side.

In claim 3, the limitation "the stationary state" is indefinite because it is unclear what the stationary state is and the term "stationary state" is not defined in the claims or in the specification. For example, a stationary state of the fuel cell can be a fuel cell that is not in operation or a fuel cell that is operating under no load variation.

In claim 3, limitation "the transition period" is indefinite because it is unclear what the transition period is the term "transition period" is not defined in the claims or in the specification. For example, is the transition period of the fuel cell the startup, the shutdown or load variation during operation of the fuel cell?

In claim 3, the limitation "said flow sensor" lacks antecedent basis within the claim. It is also unclear where this flow sensor is located in the fuel cell system.

In claim 7, the limitation "a compressor which controls the amount of the gas to be supplied into the fuel cell" is indefinite because it is unclear what gas is being referred to in this limitation. Is it the anode gas or the cathode gas?

In claim 7, the limitation "a pressure control valve which controls the gas pressure of the fuel cell and which is provided on the downstream side of the fuel cell" is indefinite because it is unclear what gas pressure of the fuel cell is being referred to since a fuel cell has two gas pressures, one on the anode side and another one on the cathode side. Furthermore, it is unclear what downstream side of the fuel cell the limitation is referring to since a fuel cell has two downstream sides, the anode downstream side and the cathode downstream side.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by the EPO English Abstract for JP 58-12268 A (and oral translation for the reference obtained at the USPTO Translation Branch on 4/1/2004).

The EPO English Abstract for JP 58-12268 discloses a process of controlling a fuel cell 1 that generates power by supplying anode gas 18 and cathode gas 14 (air) into the fuel cell 1 (see also Figure 1). The compressor 3 shown in Figure 1 controls the amount of air that is supplied into the fuel cell and a pressure control valve 7 controls the cathode gas pressure of the fuel cell

and which is provided downstream on the cathode side of the fuel cell as shown in Figure 1. The power generation amount of the fuel cell is controlled by controlling the amount of air flow through the cathode side of the fuel cell through air flow control system 9 and controlling the air pressure on the cathode side of the fuel cell through air pressure control system 7 that is provided downstream of the cathode side of the fuel cell as shown in Figure 1 such that the air pressure is controlled to be a target flow amount corresponding to the detected airflow amount which is gradually changed during the load variation (the transition period) of the fuel cell (see purpose section of the abstract).

6. Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Merritt et al. (US 5,366,821).

In general, Merritt et al. disclose a method and apparatus for providing a substantially constant output voltage from a fuel cell notwithstanding output current variations (see abstract). The reference is concerned with providing a substantially constant voltage even when its load current varies (col. 4, lines 48-51) and optimizing the oxygen utilization ratio according to the transient power output of the fuel cell to improve efficiency (col. 3, lines 59-65).

Merritt et al. disclose a fuel cell system (see Figure 2) that comprises a fuel cell 10, which generates power to a variable load 152 by supplying anode gas 112, cathode gas 162 (air) into the fuel cell and a compressor 330 (see Figure 3) that controls the amount of air to be supplied into the cathode side of the fuel cell and a pressure control valve 180 (see Figure 4) that controls the air pressure of the fuel cell and which is provided on downstream of the cathode side of the fuel cell (see abstract; col. 8, lines 38-44; col. 9, line 24 to col. 10, line 27; col. 11, line 32 to col.

12, line 45). The air flow controls means in the form of a flow calculator (see Figure 4) controls the airflow toward the cathode inlet side to be a target airflow amount corresponding to the target power generation amount (the required pressure) of the fuel cell by controlling the speed of the compressor which controls the revolution number of the motor that drives the speed of the compressor (col. 9, lines 24-46; col. 11, lines 46-67 and col. 12, lines 1-44).

If the flow rate of the oxidant is to be increased during the transition period of the fuel cell, the desired mass flow rate is implemented and maintained by changing the size of the flow control valve 180 until the flow calculator 349 (the air pressure control means) determined that the desired mass flow has been achieved and any subsequent deviation from the desired mass flow rate is similarly detected at the mass flow transducer 358 and remedied by the flow calculator 340 through the command signal 389 to the flow control valve 180 (col. 10, lines 20-27). During the stationary state of the fuel cell, the mass flow rate of the reactant gas is regulated by the flow control valve 180 at the cathode gas output of the fuel cell and the flow calculator, which is responsive primarily to the fuel cell output current and secondarily to the mass flow rate measured at the cathode gas input, actuates the flow control valve 180 (col. 5, lines 60-68).

During a transition period of the fuel cell such as when the output current of the fuel cell has changed, the flow rate of the oxidant gas can be increased without decreasing its pressure and the variable-flow control valve 180 is opened until the transducer 358 detects that the desired mass flow rate has been obtained and since an uncompensated <u>increase in the mass flow rate would be accompanied by a pressure drop</u>, any resulting tendency toward a pressure drop will be met by increasing the speed of the motor 332 sufficiently to restore the set point pressure of the

oxidant gas supply which changes the amount of air supplied by the compressor during the transition period (col. 12, lines 1-25). As can be seen in this section of the reference, changing the opening of the valve during the transition period changes the pressure of the oxidant gas stream as well as the flow rate of the oxidant gas stream through the fuel cell. The speed or the revolution number of the compressor also inherently controls the amount of airflow into the cathode inlet side of the fuel cell because it pumps the air from an air source or supply into the cathode inlet side of the fuel cell.

After the motor 332 is adjusted, the mass flow rate is again changed slightly as monitored by sensor 358 and the valve 180 is adjusted to restore the flow rate through the transducer 344 (col. 12, lines 25-28). Hence it can be seen during the transition period of the fuel cell, the feedback steps of maintaining the flow amount of air to a prescribed value and a pressure of the air to a prescribed value are stopped while the system is being configured such that successive perturbations of the pressure control and mass flow control will be smaller and smaller (air pressure control means during the transition period is kept operating until the airflow amount reaches the target value and the air pressure control means during the transition period is kept operating until the airflow amount reaches the target air flow amount) and a new state of operation (the stationary state with no load current variation) at the new mass flow rate and the original pressure will be quickly achieved after the transition state is over (col. 12, lines 29-33).

Finally, as seen in Figure 1 of applicant's present specification, the flow valve 8A is located downstream of the cathode side of the fuel cell and the compressor 7B is located upstream of the cathode side of the fuel cell. The flow valve 180 of Merritt is similarly located downstream of the cathode side of the fuel cell and the compressor 330 is located upstream of

the cathode side of the fuel cell and both the flow valve 180 and compressor 330 inherently control the pressure and flow rate of the oxidant gas through the fuel cell as recited in the instant claims because the location of the flow valve 180 is identical to the location of the flow valve 8 A shown in Figure 1 of the present specification and the location of the compressor is identical to the location of the compressor 7B shown in Figure 1 of the present specification. Although the semantics of the Merritt et al. reference may be slightly differently from that claimed in the instant claims, the processes claimed are inherently disclosed by the fuel cell system of Merritt et al. when Figures 1-4 of Merritt are compared to Figure 1 of the present application as to the location of the flow valve downstream of the oxidant side of the fuel cell and the location of the compressor upstream of the oxidant side of the fuel cell.

7. Claim 2 is rejected under 35 U.S.C. 102(e) as being anticipated by Scheffler et al. (US 6,393,354 B1) and as evidenced by Geankoplis, C. Transport Processes and Unit Operations, Third Edition, Englewood Cliffs: Prentice Hall PTR, 1993, page 138.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Scheffler et al. only disclose that an accelerator pedal may provide load demand on a fuel cell to change the speed of a vehicle (the transition period) or maintain status quo (the stationary state). The signal from the demand device of the accelerator pedal is fed to a function block 44

that controls process supply devices such as oxidant or fuel reactant control valve and/or an air blower motor which functions as an air compressor (col. 5, lines 12-67). A controller adjusting an oxidant control valve whether it is located upstream or downstream the cathode side of the fuel cell would affect the pressure of the oxidant through the fuel cell since the orifice of the valve is adjusted.

An air blower is functionally an air compressor since an air blower compresses air as evidenced by page 138 of Geankoplis, C. (Transport Processes and Unit Operations, Third Edition, Englewood Cliffs: Prentice Hall PTR, 1993),which states that in blowers and compressors pressure charges are large and compressible flow occurs. An air blower compresses air. When the speed of the air blower motor is changed, the amount of gas supplied to the fuel cell would be varied.

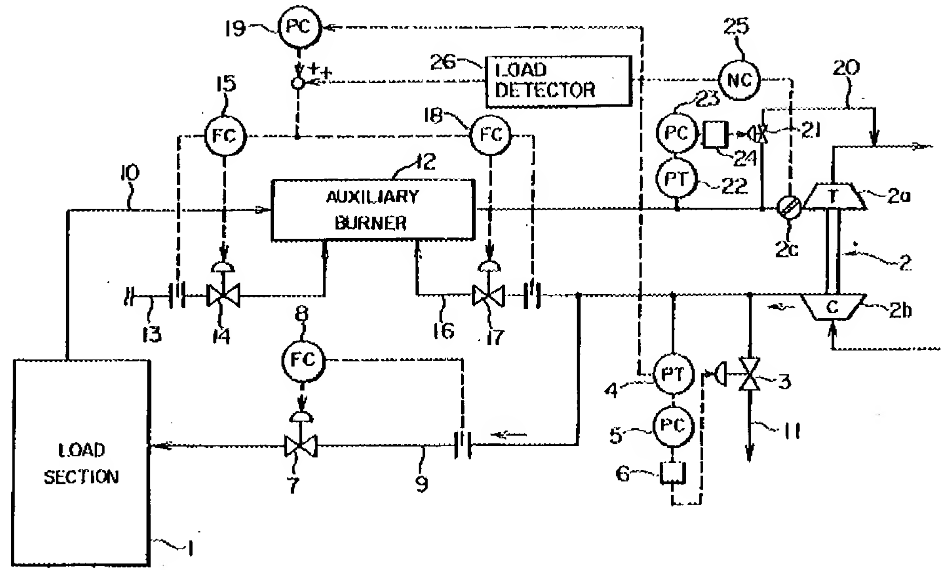
8. Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujitsuka (US 4,838,020).

Fujitsuka discloses a fuel cell system comprising a fuel cell 1 wherein the system comprises a compressor (2b) for supplying air to the cathode side of the fuel cell and a pressure regulating valve (21) that is located on the downstream side of the cathode side of the fuel cell as seen in Figure 6. The pressure regulating valve 21 and compressor 2b are controlled by controllers 23 and 25 respectively which depend on the load requirements, i.e. target electric power of the cell and regulate the control amount of the air and the pressure of the fuel cell on the downstream side of the cathode (col. 2, line 17 to col. 6, line 44).

Column 3, lines 10-16 of the reference state that a bypass conduit 20 is branched from the exhaust conduit 10 at a location upstream of the flow control valve 2c on the inlet side of the turbine 2a with a bypass valve 21 being inserted in the bypass conduit 20for regulating the flow rate of exhaust gases flowing therethrough. Variations in the target electric power, e.g. changes in load requirements over a given period of time are specifically disclosed in the operation of fuel cell systems. (col. 2 line 3 –16).

U.S. Patent Jun. 13, 1989 Sheet 6 of 6 4,838,020

FIG. 6 PRIOR ART



9. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Komiya et al. (US Pat. No. 6,703,152 B2).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

See Figure 4 and column 8, lines 3-27 of the reference.

10. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Okamoto et al. (US 6,582,841 B2).

See Figure 1 and col. 6, lines 38-43 and lines 53-61 of the reference.

Response to Arguments

11. Applicant's arguments filed 1/6/2004 have been fully considered but they are not persuasive.

The art rejections based on JPO abstract for JP 61-080762 A are withdrawn in favor of the JP 58-12268 A reference applied above that was incorporated into the JP 61-080762 A reference.

With respect to Scheffler et al., applicant asserts that the reference does not appear to describe a compressor for controlling an amount of gas to be supplied into the fuel cell.

In response, Scheffler et al. disclose at column 5, lines 12-67 that the air blower motor is controlled by a demand device and an air blower is functionally an air compressor since an air blower compresses air as evidenced by page 138 of Geankoplis, "Pumps and Gas-Moving Equipment" in Transport Processes and Unit Operations, Third Edition, Prentice Hall PTR: Englewood Cliffs, 1993,which states that in blowers and compressors pressure charges are large and compressible flow occurs. An air blower compresses air. When the speed of the air blower motor is changed, the amount of gas supplied to the fuel cell would be varied.

With respect to Merritt, applicant asserts that the reference does not teach or suggest changing an amount of supply gas supplied by a compressor during a transition period of a fuel cell as recited in claims 1 and 7 and that the fuel cell of Merritt does not appear to even have a period of operation corresponding to the transition period of the present invention where the target power generation amount varies because the Merritt fuel cell provides a constant output voltage, which does not vary.

In response, the Merritt reference clearly disclose changing the amount of air supplied by a compressor during a transition period of the fuel cell due to current load variations that require more or less oxygen in the fuel cell and corresponding more or less output power which is directly related to the increase or decrease of the current of the electrical output of the fuel cell stack as measured by current transducer 362 (col. 10, lines 27-36). Even though the voltage is maintained to be substantially constant, the output current is not and therefore the output power

is also varied due to variations in the current output. One of ordinary skill in the art is familiar with the power equation given by P (power) = V(voltage) x I (current).

With respect to Merritt, applicant asserts that the reference does not disclose, teach, or suggest changing an amount of a supply gas supplied by a compressor during the transition period of the fuel cell as recited in claims 1 and 7.

In response, applicant appears to contradict oneself since applicant states on page 8 of the amendment filed on 1/6/2004 that the Merritt reference suggest that the oxidant gas flow can be adjusted either to keep the output voltage constant for any current load. Furthermore Merritt states the required mass flow rate of the oxidant gas through the stack 10 and thus through the mass flow transducer 358 is determined by the flow calculator which is primarily responsive to the current signal of the current transducer (col. 10, lines 1-5). Merritt also states that both the compressor and the valve 180 are used to set the new mass flow rate and maintaining a pressure after the transition period is over (col. 12, lines 1-28).

With respect to Merritt applicant asserts that the variable-orifice control valve 180 described in Merritt does not appear to control the pressure of the fuel cell as recited in claims 1 and rather it is used in Merritt to control the flow rate of the oxidant gas through the system.

In response, Merritt states that increasing the mass flow rate by using valve 180 causes a pressure drop if the increase in the mass flow rate is not compensated (col. 12, lines 13-21). Adjusting or controlling the variable valve 180 inherently adjusts the pressure as well as the mass flow rate of the oxidant through the fuel cell. As seen in Figure 1 of applicant's present

specification, the flow valve 8A is located downstream of the cathode side of the fuel cell and the compressor 7B is located upstream of the cathode side of the fuel cell. The flow valve 180 of Merritt is similarly located downstream of the cathode side of the fuel cell and the compressor 330 is located upstream of the cathode side of the fuel cell and both the flow valve 180 and compressor 330 inherently controls the pressure and flow rate of the oxidant gas through the fuel cell as recited in the instant claims because the location of the flow valve 180 is identical to the location of the flow valve 8 A shown in Figure 1 of the present specification and the location of the compressor is identical to the location of the compressor 7B shown in Figure 1 of the present specification. Although the semantics of the Merritt et al. reference may be slightly differently from that claimed in the instant claims, the processes claimed are inherently disclosed by the fuel cell system of Merritt et al. when Figures 1-4 of Merritt are compared to Figure 1 of the present application as to the location of the flow valve downstream of the oxidant side of the fuel cell and the location of the compressor upstream of the oxidant side of the fuel cell.

Conclusion

12. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ Susy Tsang Foster

Susy Tsang-Foster
Primary Examiner
Art Unit 1745